

**OPTICAL DEVICES AND METHODS EMPLOYING NANOPARTICLES, MICROCAVITIES, AND  
SEMICONTINUOUS METAL FILMS**

**ABSTRACT OF THE DISCLOSURE**

5 An optical sensing enhancing material (and corresponding method of making) comprising: a medium, the medium comprising a plurality of aggregated nanoparticles comprising fractals; and a microcavity, wherein the medium is located in a vicinity of the microcavity. Also an optical sensor and sensing method comprising: providing a doped medium, the medium comprising a plurality of aggregated nanoparticles comprising fractals, with the material; locating the doped medium in the  
10 vicinity of a microcavity; exciting the doped medium with a light source; and detecting light reflected from the doped medium. Also an optical sensing enhancing material comprising a medium, the medium comprising a semicontinuous metal film of randomly distributed metal particles and their clusters at approximately their percolation threshold. The medium preferably additionally comprises a microcavity / microresonator. Also devices and methods employing such material.

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